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AUTHOR Witt, Judy Proff; Gibson, Jorie
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ABSTRACT

The paper describes a multisensory technique which involves an individualized, sequential plan of instruction for the handicapped student. The multisensory technique is explained to involve three tasks in its developmental sequence--identification, naming, and writing. The technique is applied to the case of a student whose errors on the Key Math Diagnostic Arithmetic Test indicate lack of number identification skills. It is also pointed out that multisensory techniques may be used in the regular classroom on the same basis as with a small group--individually, in tutoring partners, or with the whole group; and that the techniques are non-graded, can be used in many skill areas, and stress the direct teaching style with behavioral objectives and sequentially programed academic steps. Appended materials include a list of recommended tests for pre-post evaluations, plan sheets outlining instructional steps for developing number readiness, and sample instructional sheets. (SBH)

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A MULTISENSORY APPROACH

TO

INDIVIDUALIZED TEACHING

Judy Proff Witt
Jorie Gibson
North Clackamas School
District No. 12
Milwaukie, Oregon

EC 115223

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The purpose here is to present a practical workshop covering an instructional approach which uses a consistent multisensory technique. Multisensory refers to whenever more than two senses are used--the senses being sight, hearing, touch, taste and smell. A multisensory technique of teaching usually involves three senses. Often those senses are sight, hearing and touch. In more educational terms, they are the visual, auditory and kinesthetic modes or channels of learning.

Multisensory techniques can be used in teaching many tasks. These techniques have been adapted to teach:

1. number identification
2. basic facts
3. letter sounds
4. blending
5. spelling

When considering the handicapped population, the authors have found that the most effective teaching technique is one which involves an individualized, sequential plan of instruction. This plan needs to be unique to the students' learning style and rate. It also will follow a developmental or order of events sequence. This sequence is necessary because a person does not learn to read Shakespeare's HAMLET before reading consonant-vowel-consonant words, such as cat, pen or sit. Neither do people learn to tie shoes before learning to put them on their feet. Learning tasks must be logically sequenced.

The instructional process of the multisensory technique, as used here, is based on the model of direct teaching. Direct teaching is defined by Engleman and Becker (1975) to be a set of procedures to change behavior toward a pre-stated objective. Direct teaching always involves the following:

1. motivating or securing the student's attention to task
2. a vehicle for instruction or a specific way to present the stimulus
3. securing a response from the student
4. reinforcement if the response is correct; a specific correction procedure if the response is not correct
5. evaluation of mastery

In most cases, it is important that, before beginning instruction, a general skill level score is obtained. This is necessary for two reasons. One, when the test is given before and after (pre-post) an instructional cycle, it will measure skill growth in relation to the norm. Secondly, this testing will point out deficit areas which need further probing or testing on a criterion-referenced basis.

The pre-post score is obtained by using a norm-referenced test. Many commercial tests are available. Attached are a list of tests which are useful for this purpose.

After the pre-test score is derived, a goal for the student must be determined. To do this, the specific items within a subtest are analyzed. This analysis pinpoints specific skills the student knows and those on which he/she still needs to work. For example, if a teacher was using the KEY MATH DIAGNOSTIC ARITHMETIC TEST, he/she would examine each subtest. For purposes here, a sample student missed items A-3 and A-5 from the Numeration subtest. These errors indicate that the student needs to work on number identification. The sample of behavior here is quite small (two responses). Further testing would need to be done to find the specific numbers known and unknown. In this case, the sample student could identify no numbers. Based on that information, the following goal was set, "The student will identify the numbers one through ten."

Now that the goal has been established, it must be decided how to reach it. In other words, a sequence of skills or a task analysis must be developed. This task analysis, as mentioned above, can take two forms. The form it takes is largely dependent on the nature of the task being taught. One form is a developmental sequence; the other is an order of events sequence.

A developmental sequence is one which starts very simply and gets more difficult. For example, in speech a person begins by saying single sounds, then words, then simple sentences. Another sequence would be closer approximations--i.e., of sounds until the correct sound was made.

An order of events sequence, on the other hand, is the order of tasks needed to complete the goal. An example would be washing your hands. First, you turn on the water, then you wet your hands, take the soap, etc., until the entire sequence is complete. These kinds of tasks are usually taught by chaining; that is, teaching one step at a time in either reverse or forward order.

The goal already pinpointed--identifying the numbers one through ten--would follow the developmental sequence. Therefore, the developmental sequence will be used to demonstrate the multisensory technique.

The multisensory technique has three tasks in its developmental sequence. These are identification, naming and writing. Each task uses one or more of the senses, and the final task uses three senses--the visual, auditory and kinesthetic.

When instruction with this technique begins, it is necessary for the student to have developed some gross auditory and visual discrimination skills. The development of this early auditory and visual discrimination

is essential in the development of academic skills. Harris (1972) has said that early visual discrimination has a definite relationship to reading. For example, the eye first must be able to discriminate between shape-form relationships in objects and symbols other than letter word forms. Cordts (1965) has defined early auditory discrimination as the ability to distinguish between indoor and outdoor sounds, then discrimination of speech sounds occurs. Assuming these skills have been refined, the next step is the discrimination of units of sounds and whole words through the auditory channel and discrimination of number and letter symbols through the visual channel.

These skills are taught using the multisensory technique. The first step in this sequence is identification. The visual and auditory senses are used to train the student in the discrimination of symbols. Number symbols 1-10 are going to be used to further explain the process. The behavioral objective written to teach this student is:

1. Given a visual cue, the student will name the numbers 1-10 in random order 3/3x for two consecutive days.
2. Given an auditory cue, the student will write the numbers 1-10 in random order 3/3x for two consecutive days.

Please read the plan sheet included in this article. The headings across the top of the plan sheet correspond to the direct model of teaching described earlier. The only column that is not included is reinforcement. In an actual teaching situation, this would be included and written appropriately for the individual student. On each step of the plan sheet, there was a criterion to indicate mastery. Daily data is collected to help determine when the student has mastered each step. There are various graphs, charts and data collection devices that can be used. It is most important to match the type of data to be collected with the appropriate chart.

Throughout this plan sheet, flashcards were used to introduce the numbers. The random trial was obtained by mixing the placement of the visual cues after each trial. An alternative method of presentation would be to use prepared printed random trials or item pools. Please see the item pool included. The numbers on the side of the page indicate how many items there are in the sampling. This facilitates recording. When using an item pool, at least two different pools or sampling trials should be used so that the student does not memorize the patterns being presented. The item pool can be used for the identification and the naming steps as outlined on the plan sheet.

For the identification step, ask the students to point to the number "5". Then the student names the numbers by reading across each row. During a practice trial, correction is given immediately. If it is a test or a timed trial, correction is done following the complete trial. An item pool is especially useful when it would be too time-consuming to present all the visual cues. For example, to see if the student can name the numbers from 1-100, a sampling of numbers could be chosen. Perhaps thirty numbers with at least three numbers from each group of ten's could be used.

The basic facts in mathematics can be taught very effectively with this technique. The process for instruction is basically the same as that presented on the plan sheet. Either flashcards or an item pool can be used. With identification, the auditory cue is the answer to the problem. The student points to the correct problem. Then for naming the student would orally say the answer. Using this item pool and an acetate sheet, the student could write the answers over the problem. To test

speed and accuracy, these trials could be timed. Correction remains the same and is given after each timed trial.

Substituting sounds for the numbers on the plan sheets offers a good technique for teaching the sounds in isolation. The next logical step after teaching sounds in isolation is putting these sounds together to read and spell words. Look over the spelling scope and sequence. Read the attached plan sheet designed so that a tutor can read it. Find a friend or student and practice the spelling lesson included.

Up to this point, multisensory techniques have only been related to a one-to-one tutorial setting. This is a viable use. The technique, however, has much flexibility. One example of this flexibility is its use with small groups. If the group's individual skill levels are very close, the group may be taught as a unit. Using this approach, each step is done simultaneously by all group members.

Another small group method involves each student working independently with the teacher moving from student to student, giving direct instruction or testing. A third possibility is to have students pair up into tutoring partners. The "partners" go through the lesson together. One student takes the role of the tutor until one lesson sequence is complete; then the pair switch roles. Using the tutoring partner method, the teacher moves from pair to pair monitoring progress by giving skill checks or cycling tests.

Multisensory techniques may be used in the regular classroom on the same basis as with a small group--individually, in tutoring partners, or with the whole group.

In trying to expand the reaches of one-to-one instruction, teachers often take up a search for tutors. Potential tutors are practically limitless. They include:

1. grandparents
2. parents
3. other adult volunteers
4. paid aides
5. junior high or high school students
6. peers

When using a variety of tutors, some essential ingredients to make tutoring a success soon become apparent. The following are examples of those important ingredients:

1. Training - The time used in training tutors is time well spent. Training must be specific and should be followed up with "refreshers" at regular intervals.
2. Programming - It is the teacher's responsibility to program each tutor. Every task should be clear and simple. The task should also be geared to the amount of time available.
3. Plan Sheets - Each tutor must have a clear understanding of what he/she and the student are to do. Plan sheets help to facilitate this understanding.
4. Tracking - The teacher must have an efficient system to monitor what the student accomplishes during each tutoring session. As previously mentioned, some sample tracking systems are attached.
5. Supervision - All tutors need the security of direct supervision. The teacher should be available at all times to answer questions or provide other assistance.
6. Genuine Caring - The concern and caring for the tutor that is shown by the teacher will be passed on to the student and help to create a positive and productive learning environment.

The technique described in this workshop is non-graded, can be used in many skill areas, and stresses the direct teaching style with behavioral objectives and sequentially programmed academic steps. Students can become involved in their own learning process by tracking their daily progress. Many settings and a variety of tutors can be used to facilitate learning.

RECOMMENDED TESTS for PRE-POST EVALUATIONS

Achievement Tests:

Wide Range Achievement Test
Western Psychological Services
12031 Wilshire Blvd.
Los Angeles, California 90025

Peabody Individual Achievement Test
American Guidance Service
Publishers' Building
Circle Pines, Minnesota 55014

Woodcock-Johnson Psycho-Educational Battery - Achievement Clusters: Western Psychological Services

Math Tests:

Key Math Diagnostic Arithmetic Test
American Guidance Service

Stanford Diagnostic Math Test
Psychological Corporation
1001 Polk Street
San Francisco, California 94109

Reading Tests:

Woodcock Reading Mastery Tests
American Guidance Services

Spache Reading Diagnostic Test
CTB/ McGraw Hill
Del Monte Research Park
Monterey, California 93940

Spelling Tests:

Ayers Oral and Written Tests

Kottmeyer Diagnostic Spelling Inventory

Student _____ Date Started April 24

Program Number Readiness Date Ended April 27

Behavioral Objective Given a visual cue, the student will name the numbers 1-10 in random order 3/3x for two consecutive days. Trainer Gibson

Task	Cue	Correct Response	Correction Procedure	Criteria
IA. Identification	1a. NVC: Present the #1 on a flashcard VC: (Teacher) This is 1. Point to 1.	1a. Student points to 1.	1a. Take the student's finger, place on 1 and repeat verbal cue.	2/2 times
	b. NVC: #1 with another distractor on a flashcard VC: Point to 1. (Repeat verbal cue and mix placement of visual cues)	b. Student points to 1	1b. Take the student's finger, place on 1 and say "1". Then, "You point to 1". Student points without help.	2/2x
	c. NVC: #1 with two distractors VC: Point to 1. (Repeat verbal cue and mix visual cues)	c. Student points to 1	1c. Same correction procedure as 1b.	2/2x

Student _____ Date Started _____

Program Number Readiness (Page 2) Date Ended _____

Behavioral Objective Given a visual cue, the Trainer _____

student will name the numbers 1-10 in random order 3/3x for two consecutive days.

Task	Cue	Correct Response	Correction Procedure	Criteria
IA. (cont.)	2a. Use the procedure in Step 1 to introduce the #2.	2a-c. Student points to 2	2. Same correction procedure as in Step 1	2/2x
	b. NVC: Present #2 with another distractor VC: Point to 2 (Repeat verbal cue and mix visual cues)			2/2x
	c. Present the #2 with two distractors, repeat verbal cues and mix visual cues.			2/2x
	3a-c. Use the procedure outlined to introduce the #3.	3. Student points to 3.	3. Same correction procedure	2/2x at each step

Student _____ Date Started _____

Program Number Readiness (Page 3) Date Ended _____

Behavioral Objective _____ Trainer _____

_____

Task	Cue	Correct Response	Correction Procedure	Criteria
IB. Random Trials	1. NVC: Present all three #'s (1, 2, 3) VC: Point to 2 Point to 1 Point to 3	1. Student points to correct #.	1. NVC: Teacher points to the correct #. VC: This is ___. Point to ___. (Mix visual cues) Point to ____. (Student points without help)	2/2x for 2 consec. days
	2. NVC: Mix placement of the visual cues VC: Mix the verbal cues, Point to 3 Point to 2 Point to 1	2. Student points to correct #.	2. Same correction procedure as for 1. (It may be necessary to review the correction procedure in IA)	
IIA. Naming	1. NVC: Present the #1 on the flashcard VC: This is 1. Say its name as you trace it. Do it 3x.	1. Student traces 1	1. Model the tracing procedure. Take the student's hand and guide through the tracing. Have student do it without help.	
	2. Cover visual cue. VC: Say its name as you use your finger to write the # in your hand.	2. Student writes 1 in hand Do it 3x.	2. Same correction procedure.	

Student _____ Date Started _____

Program Number Readiness (Page 4) Date Ended _____

Behavioral Objective _____ Trainer _____

_____

Task	Cue	Correct Response	Correction Procedure	Criteria
IIA. (Cont)	3. Say the name of # as you write it with your eyes closed. Do it 3x.	3. Student writes the number	3. Have the student trace the number 3x. Close the eyes and have them try again.	
	4. Cover all visual cues. VC: Write the # on the paper.	4. Student writes the #	4. Repeat the teaching procedure Steps 1-3.	
	5. NVC: Present the #1 with other distractors. Point to number 1. VC: What is the name of this #. (Mix visual cues and repeat verbal cue)	5. Student names #.	5. VC: This is 1. Point to 1. (Mix visual cues) Point to 1.	3/3x
	6. Repeat Steps 1-5 to introduce #'s 2 and 3	6. Same responses for Steps 1-5	6. Same correction procedure	3/3x

Student _____ Date Started _____

Program Number Readiness (Page 5) Date Ended _____

Behavioral Objective Given an auditory cue, Trainer _____

the student will write the numbers 1-10 in random order 3/3x for two consecutive days.

Task	Cue	Correct Response	Correction Procedure	Criteria
IIB. Random Trials	1. NVC: Present 1, 2, 3 on flashcards. Point to a number. VC: What is the name of this #. (Present about 10 trials per day, mixing visual and auditory cues)	1. Student names the #	1. Use the teaching procedure. (Steps 1-5) Trace it 3x Write it on your hand 3x Write with your eyes closed Write it	100% on each trial for three consecutive trials for two days
III. Writing	1. NVC: Paper and pencil VC: I will say a number and you write it. (Present all #'s known at least once)	1. Student writes the correct #	1. Same correction procedure as for IIB	100% on one trial for two consecutive days

Numbers 1-10

5	**4**	**9**	**10**	**(4)**
1	**0**	**2**	**7**	**(8)**
8	**3**	**6**	**4**	**(12)**
10	**7**	**5**	**9**	**(16)**
2	**8**	**0**	**3**	**(20)**

Numbers 1-10

10	**0**	**2**	**8**	**(4)**
7	**1**	**5**	**9**	**(8)**
3	**4**	**6**	**2**	**(12)**
9	**5**	**3**	**0**	**(16)**
7	**10**	**8**	**4**	**(20)**

Speed Spelling Scope and Sequence

Part I

1.0 Short Vowels
- -short a
- -short i
- -short u
- -short o
- -short e
- -review

2.0 Consonant Blends
- -consonant +l
- -consonant +r
- -consonant +w
- -s + consonant
- -ending blends
- -ending blends (con. +t)
- -review

3.0 Consonant Diagraphs/Trigraphs
- -sh,ch
- -wh
- -th
- -tch
- -review

4.0 Controlled Vowels
- -a,e
- -e,e
- -i,e
- -o,e
- -u,e
- -review

5.0 Double Vowels
- -ee
- -oa
- -ai
- -ay
- -oo
- -ea
- -review

PART II

6.0 "r" Controlled Vowels
- -ar
- -ir
- -ur
- -or
- -er
- -review

7.0 Irregular Vowels
- -ow
- -ou
- -oy,oi
- -ew,eu
- -au
- -aw
- -review

8.0 Sounds Clusters
- -igh
- -ie
- -y,e
- -all, old, ould
- -review

9.0 Letter Combinations
- -ing, ang, eng, ong, ung
- -ink, ank, unk, onk, alk
- -le
- -review

10.0 Irregular Words

PART III

11.0 Soft c/g
- -soft c
- -soft g
- -review

12.0 Irregular Digraphs
- -kn,gn
- -wr,ph
- -review

13.0 Suffixes
- -ed
- -ing
- -ful,sh
- -ness,able
- -er
- -est, less
- -y,ly'
- -review

14.0 Prefixes
- -pro
- -re,be
- -de, pre
- -dis, mis
- -un
- -review

15.0 Singular/Plural
- -regular plurals
- -ending in s, x, z
- -ending in ch, sh
- -ending in y
- -ending in o
- -ending in fe, f
- -irregular plurals

16.0 Letter Combinations
- -augh, ough, ought
- -ment, ous, tive
- -tion
- -sion
- -review

5.1 Double vowel words — ee

OBJECTIVE	WHAT TUTOR SAYS	WHAT STUDENT DOES	WHAT TUTOR SAYS/DOES IF STUDENT IS RIGHT	WHAT TUTOR SAYS/DOES IF STUDENT IS WRONG
Given a list of words, student (S) says 20 words per minute with 2 errors or less.	A. **Read these words.** B. **I am going to time you for 1 minute. Keep reading the words until the minute is over. Ready, read.**	A. Reads words. B. Reads words.	A. **Good reading!** B. Count and chart the number of words right and wrong in 1 minute on Word Reading graph.	A. (1) **Listen** (say sounds of the word) (2) **Sound it out with me** (say sounds together) (3) **Sound it out by yourself** (student says sounds) (4) **What word?** (student says word)
When tutor says words, S writes 12 words in 1 minute with 2 errors or less.* Grades 1-3: write 10 words with 1 error or less.*	A. **Write these words as I say them.** B. **I am going to time you for 1 minute. Keep writing the words as I say them until the minute is over. Ready . . .**	A. Writes words. B. Writes words.	A. **Good spelling!** B. Count and chart the number of words right and wrong in 1 minute on Word Writing graph.* Write words missed on the Tutor Record Sheet.	A. See "How to Study" in the SPEED SPELLING *Student Book*
When tutor reads 2 sentences, S writes the words of the sentences with no spelling errors.	A. **Write this sentence . . .** (Choose 2 sentences. Read each 2 times slowly as S writes.)	A. Writes sentence.	A. **Good writing!** Count and chart the number of sentences with no spelling errors on the Sentence Writing graph.	A. Have S write the sentence the right way 1 time.

Word List

feet /ē/

feed	beef	feel	heel	4
deep	seem	seed	weed	8
jeep	keep	need	bee	12
fleet	green	wheel	dead	16
screech	cheek	three	teeth	20
sleet	meek	tweet	weep	24

Dictation Sentences**

Feed *the* bee *the* beef.
The lake *is* deep.
Feel this green weed.
Keep *the* jeep *in the* fleet.
Will the wheel tweet?
I need three teeth.

* When the S meets criterion (writes 12 words in 1 minute with 2 errors or less), write the date on the Skills Checklist in the *Student Book*.

** If any italicized word is new to the S, review the word before dictating the sentence, saying "Let's practice this new word." Have S write the new word three times.

5.1

ee feet /ē/

feed	beef	feel	heel	4
deep	seem	seed	weed	8
jeep	keep	need	bee	12
fleet	green	wheel	deed	16
screech	cheek	three	teeth	20
sleet	meek	tweet	weep	24

Correct/Errors

CODE: 0 = # correct
X = # of errors

number above 20																					
	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
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	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lesson																					
Date																					